2011 EU Summary Report on Zoonoses: overview on Campylobacter

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EURL - Campylobacter workshop, Aberdeen, 19 September 2013
• Zoonoses data collection
• 2011 EU Summary Report on Zoonoses
• Main findings on *Campylobacter*
• Collection of Molecular typing data
• BIOHAZ opinion on meat inspection
EFSA’s tasks

1. Provide independent scientific advice and support for EU legislation and policies in all fields that impact food and feed safety

2. Collect and analyse data to allow characterisation and monitoring of risks

3. Promote and coordinate development of uniform risk assessment methodologies

4. Communicate risks related to all aspects of EFSA’s mandate
Activities currently focused on three areas:

- Annual data collection and reporting on zoonoses, AMR and food-borne outbreaks in EU
- Survey design and analyses of EU-wide baseline surveys on zoonotic agents in animals and food
- Meat inspection mandate – define epidemiological criteria for adaptations of current meat inspection methodology
EUSR: zoonoses data collection

• Directive on the monitoring of zoonoses and zoonotic agents (2003/99/EC)
  ➔ gives EFSA the task to examine the data collected from the Member States and to publish an annual EU summary report (EUSR)

• EFSA took over the task in 2005

• MSs have an obligation to report each year
Data collection mandatory for 8 zoonoses:
- *Salmonella* (+ antimicrobial resistance)
- *Campylobacter* (+ antimicrobial resistance)
- *Listeria monocytogenes*
- *Brucella*
- Tuberculosis due to *Mycobacterium bovis*
- Verotoxigenic *Escherichia coli*
- *Trichinella*
- *Echinococcus*

And also for foodborne outbreaks
- Analyses of trends over the years (in MS/ EU)
- Identification of sources of human infections (which foodstuffs / animal species)
- Comparison of prevalence/proportion positives at different food/animal categories/points of food chain
- Analyses of food-borne outbreak data
- Spatial (geographical) distributions (maps)
EFSA collects and analyse data on zoonoses and publishes an annual EU Summary Report in collaboration with the European Centre for Disease Prevention and Control (ECDC).

ECDC provides for and analyses the data on human zoonoses cases.

Human zoonoses cases & notification rates, EU, 2011

Zoonoses

- Campylobacteriosis (N = 220,209)
- Salmonellosis (N = 95,548)
- VTEC (N = 9,485)
- Yersiniosis (N = 7,017)
- Listeriosis (N = 1,476)
- Echinococcosis (N = 781)
- Brucellosis (N = 330)
- Trichinellosis (N = 268)
- Tuberculosis caused by M. bovis (N = 132)
- Rabies (N = 1)

Notification rate per 100,000 population
Trend in reported confirmed campylobacteriosis cases of human campylobacteriosis in the EU, 2008-2011

- Source: Data for EU trend 24 MSs: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom. Bulgaria is excluded because only monthly data were reported.
### Campylobacter in food in EU, 2011

<table>
<thead>
<tr>
<th>Data</th>
<th>Total number of reporting MSs</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry meat(^1)</td>
<td>19</td>
<td><strong>MSs:</strong> AT, BE, DE, DK, EE, ES, HU, IE, IT, LT, LU, NL, PL, PT, RO, SK, SI, SE, UK</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Non-MS:</strong> CH</td>
</tr>
<tr>
<td>Pig meat</td>
<td>16</td>
<td><strong>MSs:</strong> AT, BE, CZ, DE, ES, HU, IE, IT, LT, LU, NL, PL, PT, RO, SE, SK</td>
</tr>
<tr>
<td>Bovine meat</td>
<td>14</td>
<td><strong>MSs:</strong> AT, BE, CZ, DE, ES, HU, IE, IT, LU, NL, PL, PT, SE, SK</td>
</tr>
<tr>
<td>Other types of meat(^2)</td>
<td>13</td>
<td><strong>MSs:</strong> AT, BE, CY, DE, ES, IE, IT, LT, LU, NL, PL, PT, SE</td>
</tr>
<tr>
<td>Milk and dairy products</td>
<td>9</td>
<td><strong>MSs:</strong> AT, BE, DE, HU, IE, IT, NL, SE, SK</td>
</tr>
<tr>
<td>Other food(^3)</td>
<td>11</td>
<td><strong>MSs:</strong> AT, BE, CZ, DE, DK, ES, IE, IT, LT, SE, SK</td>
</tr>
</tbody>
</table>
• Broiler meat is considered to be the main food-borne source of human campylobacteraiosis

  – Overall, 31.3 % of the samples (single or batch) were found to be positive in the reporting MSs.

  – As in previous years, the proportions of *Campylobacter*-positive broiler meat samples varied widely among MSs, with the prevalence ranging from 3.2 % to 84.6 %. Notably, four MSs (Ireland, Luxembourg, Poland, and Spain) reported very high (>50 %) or extremely high proportions (>70 %) of positive samples.

  – At the slaughterhouse, Denmark, Hungary, Ireland, Poland and Spain reported testing of single carcasses, with the proportion of positive samples ranging from 10.6 % in Denmark to 72.1 % in Ireland.
• In 2011, seven and four MSs reported data on the occurrence of *Campylobacter* in pig meat and bovine meat, respectively, sampled at different stages in the production chain.

• Positive samples were also infrequently reported from RTE minced meat, meat preparations and meat products.

• Some positive findings were reported by two MSs in samples from cheeses, milk, and other dairy products excluding cheeses.

• Few MSs have also infrequently reported positive samples from fishery products, fruit and vegetables, spices and herbs, as well as other processed food products and prepared dishes.
Campylobacter in food, 2011

• Number of samples within food categories tested ranged from a few to several thousand samples.

• Majority of the samples were from food of animal origin
  → primarily from poultry meat.

• Sampling and testing methods varied between countries
  → results from different countries are not directly comparable.

• Proportion of positive samples may be influenced by the time of year at which samples were taken.
  → in many countries Campylobacter are known to be more prevalent during summer than during winter.
## Campylobacter in animals in EU, 2011

<table>
<thead>
<tr>
<th>Data</th>
<th>Total number of reporting MSs</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poultry¹</td>
<td>16</td>
<td>MSs: AT, CZ, DE, DK, EE, ES, FI, IE, IT, LV, NL, RO, SE, SI, SK, UK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-MSs: CH, IS, NO</td>
</tr>
<tr>
<td>Pigs</td>
<td>9</td>
<td>MSs: DE, ES, IE, IT, LV, NL, RO, SK, UK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-MS: CH</td>
</tr>
<tr>
<td>Cattle</td>
<td>12</td>
<td>MSs: AT, DE, ES, IE, IT, LU, LV, NL, PL, RO, SK, UK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-MSs: CH, NO</td>
</tr>
<tr>
<td>Sheep and goats</td>
<td>7</td>
<td>MSs: DE, IE, IT, NL, RO, SK, UK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-MSs: CH, NO</td>
</tr>
<tr>
<td>Pets²</td>
<td>8</td>
<td>MSs: DK, EE, IT, LV, NL, RO, SK, UK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-MSs: CH, NO</td>
</tr>
<tr>
<td>Other animals</td>
<td>10</td>
<td>MSs: DE, DK, IE, IT, LV, NL, PL, PT, SK, UK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-MSs: CH, NO</td>
</tr>
</tbody>
</table>
• 19 MSs and three non-MSs reported data on *Campylobacter* in animals primarily in broiler flocks, but also in pigs and cattle and to some extent in goats, sheep and pets.

• The occurrence of *Campylobacter* varied widely among the six MSs reporting slaughter batch-based data, with prevalence ranging from 0% to 92.0%. The only MS reporting animal-based data was Romania, and the prevalence was 96.1% (out of 102 units tested).

• In three of the four MSs reporting flock-based data, the reported prevalence was very high (≥ 60%) to extremely high (≥ 80%).

• In 2011, a survey of broilers slaughtered in small-scale abattoirs was performed in Sweden using the same sampling strategy as in the Swedish *Campylobacter* official monitoring programme that covers 99% of slaughtered broilers (from seven abattoirs, all belonging to the Swedish Poultry Meat Association). At the flock level, the occurrence of *Campylobacter* in samples from small-scale abattoirs (60.1%) was much higher than in samples collected within the framework of the official monitoring programme (12.8%).
## Causative agents in all food-borne outbreaks in the EU, 2011

<table>
<thead>
<tr>
<th>Causative agent</th>
<th>N</th>
<th>%</th>
<th>Strong evidence outbreaks (n)</th>
<th>Weak evidence outbreaks (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Salmonella</strong></td>
<td>1,501</td>
<td>26.6</td>
<td>283</td>
<td>1,218</td>
</tr>
<tr>
<td>Bacterial toxins</td>
<td>730</td>
<td>12.9</td>
<td>119</td>
<td>611</td>
</tr>
<tr>
<td>Campylobacter</td>
<td>598</td>
<td>10.6</td>
<td>39</td>
<td>559</td>
</tr>
<tr>
<td>Viruses</td>
<td>525</td>
<td>9.3</td>
<td>92</td>
<td>433</td>
</tr>
<tr>
<td>Other causative agents</td>
<td>113</td>
<td>2.0</td>
<td>89</td>
<td>24</td>
</tr>
<tr>
<td>Escherichia coli, pathogenic</td>
<td>63</td>
<td>1.1</td>
<td>17</td>
<td>46</td>
</tr>
<tr>
<td>Other bacterial agents</td>
<td>47</td>
<td>0.8</td>
<td>6</td>
<td>41</td>
</tr>
<tr>
<td>Parasites</td>
<td>31</td>
<td>0.5</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>Yersinia</td>
<td>17</td>
<td>0.3</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Unknown</td>
<td>2,023</td>
<td>35.8</td>
<td>48</td>
<td>1,975</td>
</tr>
<tr>
<td><strong>EU Total</strong></td>
<td>5,648</td>
<td>100</td>
<td>701</td>
<td>4,947</td>
</tr>
</tbody>
</table>
Distribution of food vehicles in strong evidence Campylobacter outbreaks (excluding strong evidence waterborne outbreaks) in the EU, 2011

- Broiler meat (Gallus gallus) and products thereof: 45.9%
- Milk: 13.5%
- Other foods: 13.5%
- Other, mixed or unspecified poultry meat and products thereof: 10.8%
- Dairy products other than cheese: 5.4%
- Mixed food: 5.4%
- Pig meat: N=37

N=37
Two outbreaks due to *Campylobacter - C. Jejuni* occurred in Belgium and Finland

- Finland
  - household

- Belgium
  - Youth camp, 64 out of 130 exposed children became ill.
Conclusions

- Campylobacteriosis has, since 2005, continued to be the most commonly reported zoonosis in humans in the EU.

- Significant increasing trend in the EU notification rate of confirmed cases in the last five years

- Poultry meat still appears to be the most important food-borne source of Campylobacter since the occurrence of the bacteria remained at a high level in fresh poultry meat.
The Standing Committee on Food Chain and Animal Health (representing all EU Member States) approved in December 2012 a vision paper on the development of databases for molecular testing of food-borne pathogens in view of outbreak preparedness.

In January 2013, EFSA received a mandate from the Commission on support on the collection of data on molecular testing in food/animal isolates of foodborne infections.

The purpose is to set up the molecular typing data collection at EU level for isolates from human cases, food and animals.

This will facilitate better investigations of food-borne outbreaks and source attribution (identification of main food and animal sources of human infections).
Molecular typing data collection in the EU

- **ECDC** to collect molecular typing data from foodborne pathogens isolated from human cases

- **EFSA**, in collaboration with relevant EU Reference Laboratories (EURLs), to collect similar data from food, feed and animal isolates

- Regular joint analyses of the data by ECDC, EFSA and EURLs – integration at EU level

- The data collection to cover initially *Salmonella*, VTEC and *Listeria* with **PFGE** and **MLVA** (only for S. Typhimurium) methods – other methods and pathogens can be taken aboard later
Molecular typing data collection in the EU
General Schema

Competent Authorities
- NRLs
- Other Official Laboratories

Non-human Molecular Typing databases

Descriptive Data AND Typing Data

EURLs
- *Salmonella*
- VTEC
- *L. monocytogenes*

Curation activities

EURLs involved in the analyses

EFSA database

Typing Data ONLY

ECDC/EFSA Joint Analyses: mode to be agreed upon

Human Molecular Typing databases

Descriptive Data AND Typing Data

ECDC database

Typing Data ONLY

ECDC’s curators

Naming of patterns
EFSA has set up a Working Group to define the structure of the data collection system and integration with the human data.

In order to guarantee compatible data collection systems for human, food and animal isolates, EFSA, EURLs and ECDC to agree on:

- Common nomenclature,
- Common data dictionaries,
- Similar SOPs etc.
Molecular typing on food and animal isolates

**Submission and curation**

- Submission of isolate-based data to the EFSA database using DCF
  - Upload and approval of data: manual and machine-to-machine submissions
  - Frequency of submission

- Curation of data by relevant EURLs
  - Curators to have access to EFSA database to perform the task of curation
    - Maintaining the confidentiality of the data
  - Curation of PFGE data (Bionumerics) and MLVA data
    - Assessment of the quality of the TIFF images
    - Evaluation of processes of normalization and band assignment
  - Curation of MLVA data

- Assignment of EFSA nomenclature and Detection of Cluster
  - EFSA temporary nomenclature assignment
  - Cluster detection within animal and food data on the typing profiles
  - EFSA nomenclature revision (following cluster detection)
Molecular typing on food and animal isolates

**IT system**
- Import, store, export isolate data
- Epidemiological and MT data

**EFSA Plug-In**

**Cluster Analysis Interface**

**Data Upload/Download Interface**

**Molecular typing (MT) Data**
Stores approved data:
- *Salmonella*
- *L. monocytogenes*
- VTEC

**Cluster Analysis Interface**
- Browser: interactively viewing the cluster analysis results
- Browser (XML or CSV): manual

- Machine to machine (XML)

**Returns to laboratories:**
- Validation results,
- ‘curated’ data,
- server selection of profiles through bundle files

**Authenticates the user**

**Curators - EURs**
- Assessing quality of submitted data
- Assigning nomenclature
- Searching for and assigning clusters

**Virtual Private Connection (VPN)**
- to analysis data, software running at EFSA

**Stores:**
- Epidemiological data
- Metadata

**Stores uploaded XML**

**EFSA Molecular Typing Data Collection**
Molecular typing on food and animal isolates
Joint Analyses of ECDC and EFSA data

- Analysis of cluster of isolate data from animal, food, feed and human origins / between ECDC and EFSA
  - Frequency
  - Exchange of data: Where to perform the comparison?

  **ECDC database** ↔ ‘On-the-fly comparison’ ↔ **EFSA database**

  - Cluster detection and assignment of ECDC nomenclature to EFSA isolate data
1. Data collection, validation, curation and analysis
   • Collection and validation of molecular typing data
   • Curation of molecular typing data by relevant EURLs
   • Analysis of molecular typing data in EFSA

2. Data exchange and analyses with ECDC system and cluster analyses by MSs
   • Web interface with ECDC and distributed EFSA-ECDC database analyses
   • Web interface with laboratories for cluster analysis (allowing comparison of isolate data submitted with the database and possible clustering)

3. Curated data provided to MSs/Laboratories
   • Functionalities for providing back to laboratories either unique PFGE profiles or server selection of profiles through bundle files and curated data